

Claims

1.

1 A child-resistant closure and container package that includes:
2 a container having a finish with at least one external thread, at least
3 one pocket in an undersurface of said thread, and an axially facing end
4 surrounding a container mouth, and
5 a closure having a base wall, a skirt with an axis, at least one
6 internal thread and at least one lug on said internal thread for receipt in said
7 pocket, and a spring disposed between said base wall and said end of said
8 finish to bias said closure away from said finish and urge said lug into said
9 pocket,
10 said spring comprising a progressive spring that includes at least
11 two axially and circumferentially extending spring rings carried by the closure
12 at an angle to said axis, said spring rings being radially spaced from each
13 other, a first of said spring rings having a greater axial dimension than the
14 second of said spring rings and axially overlying said second spring ring.

2.

1 The package of claim 1 wherein said pocket is defined by an
2 interruption in the external thread on said finish.

3.

1 The package of claim 1 wherein the spring rings are carried by the
2 base wall of the closure.

4.

1 The package of claim 3 wherein at least one of the spring rings is
2 radially aligned with said axially facing end of the finish so that said at least
3 one spring ring engages the axially facing end of the finish when the closure is
4 received on the finish.

5.

1 The package of claim 1 wherein the spring rings are concentrically
2 arranged.

6.

1 The package of claim 1 wherein the spring rings are
2 circumferentially continuous and one of said spring rings provides a seal
3 between the closure and container when the closure is received on the finish.

7.

1 The package of claim 1 wherein the first spring ring at least
2 partially radially overlies the second spring ring.

8.

1 The package of claim 1 wherein the spring rings are disposed at the
2 same angle relative to said axis.

9.

1 The package of claim 1 wherein the lug has a shoulder engagable
2 with the external thread to limit rotation of the closure when the lug is in said
3 pocket and a ramp surface to facilitate rotation of the closure relative to the
4 finish when the lug is not in said pocket.

10.

1 The package of claim 1 wherein the first spring ring has different
2 spring characteristics than the second spring ring.

11.

- 1 The package of claim 1 wherein said at least two spring rings
2 extend radially outwardly relative to said axis.

12.

- 1 The package of claim 11 wherein the first spring ring is disposed
2 radially inwardly of the second spring ring.

13.

- 1 The package of claim 1 wherein said at least two spring rings
2 extend radially inwardly relative to said axis.

14.

- 1 The package of claim 13 wherein the first spring ring is disposed
2 radially outwardly of the second spring ring.

15.

- 1 The package of claim 1 which also comprises a third spring ring
2 radially spaced from the second spring ring and having an axial dimension
3 less than that of the second spring ring.

16.

1 A closure for a container and closure package, said closure
2 includes:
3 a base wall,
4 a skirt with an axis extending from said base wall,
5 at least one internal thread;
6 at least one lug on said internal thread; and
7 a spring disposed carried by the base wall and adapted to yieldably
8 bias the closure in a direction moving the base wall away from a container on
9 which the closure is received, said spring comprising a progressive spring that
10 includes at least two axially and circumferentially extending spring rings
11 extending from said base wall at an angle to said axis, said spring rings being
12 radially spaced from each other, a first of said spring rings having a greater
13 axial dimension than the second of said spring rings and axially overlying said
14 second spring ring.

6

17.

1 The closure of claim 16 wherein the spring rings are carried by the
2 base wall of the closure.

18.

1 The closure of claim 16 wherein the spring rings are concentrically
2 arranged.

19.

1 The closure of claim 16 wherein the spring rings are
2 circumferentially continuous and one of said spring rings provides a seal
3 between the closure and container when the closure is received on the
4 container.

20.

1 The closure of claim 16 wherein the spring rings are disposed at
2 the same angle relative to said axis.

21.

1 The closure of claim 16 wherein the first spring ring has different
2 spring characteristics than the second spring ring.

22.

1 The closure of claim 16 wherein said at least two spring rings
2 extend radially outwardly relative to said axis.

23.

- 1 The closure of claim 22 wherein the first spring ring is disposed
2 radially inwardly of the second spring ring.

24.

- 1 The closure of claim 16 wherein said at least two spring rings
2 extend radially inwardly relative to said axis.

25.

- 1 The closure of claim 24 wherein the first spring ring is disposed
2 radially outwardly of the second spring ring.

26.

- 1 The closure of claim 16 which also comprises a third spring ring
2 radially spaced from the second spring ring and having an axial dimension
3 less than that of the second spring ring.

1 A method of making a container and closure package, including
2 the steps of:

3 forming a container having a finish with at least one external
4 thread, at least one pocket in an undersurface of said thread, and an axially
5 facing end surrounding a container mouth, and

6 forming a closure having a base wall, a skirt with an axis, at least
7 one internal thread and at least one lug on said internal thread for receipt in
8 said pocket, and a spring disposed between said base wall and said end of said
9 finish to bias said closure away from said finish and urge said lug into said
10 pocket,

11 said spring comprising a progressive spring that includes at least two
12 axially and circumferentially extending spring rings carried by the closure at
13 an angle to said axis, said spring rings being radially spaced from each other, a
14 first of said spring rings having a greater axial dimension than the second of
15 said spring rings and axially overlying said second spring ring.

28.

1 The method of claim 27 wherein the step of forming the closure
2 includes forming the spring rings integrally with the base wall and extending
3 axially and radially outwardly from the base wall.

29.

1 The method of claim 27 wherein the step of forming the closure
2 includes forming the spring rings integrally with the base wall and extending
3 axially and radially inwardly from the base wall.

30.

1 The method of claim 19 wherein the step of forming the container
2 includes forming the pocket by providing an interruption in the external
3 thread.